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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
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ECHELMAYER, ALIX ELIZABETH

ART UNIT	PAPER NUMBER
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1745

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07/03/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/821,323

Applicant(s)

HOSOYA ET AL.

Examiner

Alix Elizabeth Echelmeyer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office Action is in response to the amendments filed March 21, 2007.

Claims 1 and 5 have been amended. Claims 1-5 are pending and are rejected finally for the reasons given below.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1 and 5 recite the limitation "the second coating layers". There is insufficient antecedent basis for this limitation in the claim. In both claims, a second coating layer is not recited before "the second coating layers" is recited.

4. Claims 1 and 5 are rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicants regard as their invention. Evidence that claims 1 and 5 fails to correspond in scope with that which applicants regard as the invention can be found in the instant specification. In that paper, applicant has disclosed particles having a layered structure (abstract), and this statement indicates that the invention is different from what is defined in the claims because the particles are first recited as "having a layered structure" (claim 1 lines 2; claim 5 line 3). Yet, the second coating layer is later defined in the claims as "formed on at least parts of the surfaces of the particles" (claim 1 line 4; claim 5 lines 5-6). It would be redundant to form a coating

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layer on a layered particle if both the top layer of the particle and the coating layer were formed from the same material.

The examiner believes that Applicants meant to claim their invention as a positive electrode material (claim 1) or non-aqueous electrolyte secondary battery comprising a positive active material (claim 5, with the positive active material such as the material of claim 1). The positive active material comprises particles, which have a layered structure, wherein the structure is a first compound oxide of lithium and nickel with a coating layer of a second compound oxide of lithium and titanium, the second coating layer being formed on at least parts of the surfaces of the particles of the first compound oxide of lithium and nickel. The claims as amended in the amendment filed March 21, 2007 appear to misuse the term "particles" since the term used to describe both the "particles of positive active material" and "particles of the first compound oxide of lithium and nickel."

For the purposes of examination, the first occurrence in each of claims 1 and 5 of the word "particles" will be interpreted to mean "particles of positive active material" and the second occurrence will be interpreted to mean "particles of the first compound oxide of lithium and nickel."

Under the interpretation of the previous paragraph, the second occurrence of the word "particles" lacks antecedent basis in the claims.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oesten et al. (US 2001/0046628 A1) in view of Spitler (US 2004/0197657).

Oesten et al. disclose a coated lithium nickel mixed oxide particle and the method of making the particle for use as the cathode material in an electrochemical cell. The coated lithium mixed oxide particles are used to improve the properties of the electrochemical cell. The particle core is a lithium mixed oxide containing nickel ([0032]) such as  $\text{Li}_x\text{Ni}_y\text{Mn}_{2-y}\text{O}_4$ . The particle coating is a metal oxide or a mixture of alkali metal compounds and metal oxides ([0033], [0034]). The use of titanium oxide as the particle coating is disclosed ([0034]).

The lithium mixed oxide particles of the active material of Oesten et al. correspond to the first compound oxide of lithium and nickel in claims 1 and 5 of the instant application. The particle coating of, for example, titanium oxide as taught by Oesten et al. corresponds to the second compound oxide of lithium and titanium of the instant application. As in the instant application, the titanium oxide of Oesten et al. is coated on particles of the lithium mixed oxide containing nickel.

Regarding claim 2, Oesten et al. do not explicitly teach that the weight ratio of the first compound oxide to the second compound oxide is between 96:4 and 65:35. Oesten

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et al. do teach that the weight ratio of the coating metal oxide to the lithium mixed oxide particles is from 0.01 to 20 percent. The weight ratio of the alkali metal to the lithium mixed oxide particles in the cathode is from 0.01 to 10 percent. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the weight relationship between the core oxide material and the coating oxide material such as taught by Oesten et al. in order to provide a thick enough coating that inhibits the undesirable reactions of the acid with the electrode material. It has been held that where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art. In re Aller, 105 USPQ 233. MPEP 2144.05 (IIB).

As for claims 1 and 5, Oesten et al. fail to teach that the titanium oxide particle coating is one of those listed in the amendment. Additionally, Oesten et al. fail to teach the limitation of claim 3 that the titanium oxide material has a spinel structure.

Spitler et al. teach the use of a lithium titanium spinel oxide ( $\text{Li}_4\text{Ti}_5\text{O}_{12}$ ) as the positive material for the cathode of a lithium ion battery ([0001]).

Spitler et al. further teach that the lithium titanate spinel oxide allows for an extremely high charge and discharge rates and a large number of charge and discharge cycles ([0022]).

It would be desirable to use the lithium titanium spinel oxide ( $\text{Li}_4\text{Ti}_5\text{O}_{12}$ ) of Spitler et al. as the lithium oxide of the coating of Oesten et al. since the lithium titanium spinel oxide ( $\text{Li}_4\text{Ti}_5\text{O}_{12}$ ) allows for extremely high charge and discharge rates and a large number of charge and discharge cycles.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the mixture of alkali metal compounds and metal oxides coating of Oesten et al. to include a spinel lithium titanate oxide as the titanium oxide material such as taught by Spitler et al. in order to enhance the charge and discharge rate of the electrochemical cell. Such a spinel compound is structurally stable in the electrolyte of the battery.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oesten et al. in view of Spitler et al. as applied to claim 1 above, and further in view of Naruoka et al. (US 6,893,766 B2).

The teachings of Oesten et al. and Spitler et al. as discussed above are incorporated herein.

Oesten et al. and Spitler et al. teach the coated positive electrode active material of the instantly claimed invention, but fail to teach that the material has a mean particle diameter of 5 to 20  $\mu\text{m}$ .

Naruoka et al. teach a positive active material for a secondary battery. The positive active material is lithium nickel composite oxide (col. 2 lines 45-56). The mean particle diameter of the lithium nickel composite oxide is 4 to 25  $\mu\text{m}$  (col. 3 lines 44-51).

Naruoka et al. teach that if the mean particle diameter of the positive electrode active material is smaller than 4  $\mu\text{m}$ , there may not be continuous contact with the electrically conductive material. Naruoka et al. also teach that if the mean particle diameter of the positive electrode active material is larger than 25  $\mu\text{m}$ , the electrolyte

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may not penetrate the electrode material. This would adversely affect the charge and discharge rates of the battery (col. 3 lines 51-59).

It would be desirable to use make the positive active material of Oesten et al. in view of Spitler et al. having particles in the range of 4-25  $\mu\text{m}$ , within which 5-20  $\mu\text{m}$  falls, since particle sizes outside of that range adversely affect the charge and discharge rates of the battery, either by preventing continuous contact with the electrically conductive material or by not allowing the electrolyte to penetrate the electrode material.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the positive electrode active material of Oesten et al. in view of Spitler et al. having a mean particle size in the range of 5 to 20  $\mu\text{m}$  as taught by Naruoka et al. in order to maintain electrical conductivity within the battery and improve charge and discharge rates in the battery.

### ***Response to Arguments***

8. Applicant's arguments filed March 21, 2007 have been fully considered but they are not persuasive.

Applicants argue that the prior art relied upon in the previous rejection, specifically the combination of Oesten et al. and Spitler et al., fails to teach coating layers on particles of lithium or nickel.

The rejection above, as applied to the newly amended claims, provides motivation to use the material of Spitler et al. as the titanium oxide coating of Oesten et al. Oesten et al. teach a titanium oxide coating such as the one of the instantly claimed



invention on a lithium nickel oxide positive electrode active material; however, Oesten et al. fail to teach a specific titanium oxide.

Spitler et al. teach a titanium oxide,  $\text{Li}_4\text{Ti}_5\text{O}_{12}$ , for use in a positive electrode active material. One of ordinary skill in the art would be motivated to use  $\text{Li}_4\text{Ti}_5\text{O}_{12}$  as the titanium oxide of Oesten et al. since it has characteristics that are desirable in the battery.

Therefore, the combination of Oesten et al. and Spitler et al. teaches a lithium titanium oxide compound coated on a lithium nickel oxide compound, and the use of such a material as a positive electrode active material.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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PRIMARY EXAMINER